

REMARKS

Reconsideration of the application is requested in view of the modifications above and the remarks below.

Claim Objections

The Office Action objected to Claims 4-6 on the grounds that they were in multidependent form. In view of the modifications above, the objection is believed overcome. Reconsideration is requested.

Rejection Under 35 USC 102

The Office Action rejected Claims 1, 3, and 7, on the grounds that they were clearly anticipated by XP-000874467 (Alonso). The rejection should be withdrawn in view of the modifications made above and the remarks below. It is well settled that in order for a prior art reference to anticipate a claim, the reference must disclose each and every element of claim with sufficient clarity to prove its existence in the prior art. The disclosure requirement under 35 USC 102 presupposes knowledge of one skilled in art of claimed invention, but such presumed knowledge does not grant license to read into prior art reference teachings that are not there. *See Motorola Inc. v. Interdigital Technology Corp.* 43 USPQ2d 1481 (1997 CAFC).

Applicants' invention relates to a process that makes a tungsten carbide. The process involves gas phase carburization of tungsten powders and/or suitable tungsten precursor compound powders at a temperature ranging from 850°C to 950°C, such that the carburizing gas phase used is a CO₂/CO mixture. The CO₂ content is above the Boudouard equilibrium content corresponding to the carburization temperature. The carburization is carried out with a carbon activity ranging from 0.4 to less than 1. In one embodiment, the carburization is carried out with a carbon activity from 0.4 to 0.9. In another embodiment, the carburization temperature ranges from 900°C to 950°C. In another embodiment, the carburization is carried out at carburization temperature over a period from 4 to 10 hours. In another embodiment, the precursor compound used is tungsten oxide powder. And in another embodiment, the process further involves subjecting the tungsten carbide made to a heat treatment at 1,150°C to 1,800°C after carburization.

Alonso discloses the production of tungsten carbide (WC) from tungsten trioxide (WO₃) by means of CO-CO₂ mixtures (61, 78 and 100% v/v CO) in the

temperature interval ranging from 700 °C to 1100 °C (See Abstract). Alonso discloses that between 700 and 800 °C, the process was controlled by the nucleation and growth of the lower oxide $W_{20}O_{58}$, whereas between 800 and 1100 °C the process was controlled by the elementary reaction $WO_2 \rightarrow W$. Alonso discloses that a second order dependence of the initial rate constant with respect to partial CO pressure was estimated. The thermomechanical data used for the W-C-O system were consistent with the experimental results. Alonso concluded that the most appropriate conditions for the reduction-carburization of tungsten trioxide by means of carbon monoxide-carbon dioxide mixtures were a temperature of 900 °C, a gaseous mixture composition of 100% v/v CO, a volumetric flow rate of 1450 ml (STP)/min and a time of 6 hours. Under these conditions, according to Alonso a tungsten carbide powder with an average particle diameter of 0.40 μm was obtained.

Alonso does not anticipate Applicants' invention. Alonso's disclosures about the production of tungsten carbide from tungsten trioxide by means of CO-CO₂ mixtures do not disclose Applicants' process for making a tungsten carbide. Alonso's disclosure, for instance, that between 700 and 800 °C, the process was controlled by the nucleation and growth of the lower oxide does not disclose every element of Applicants' invention. Alonso's conclusion concerning the most appropriate conditions for the reduction-carburization of tungsten trioxide do not disclose Applicants' process. Reconsideration is requested.

Importantly, Alonso discloses gas-phase carburization of tungsten trioxide using CO as well as using CO₂/CO mixtures at a temperature of 900°C. The mixtures disclosed contain 78 and 61% by volume of CO, respectively. At a temperature of 900°C, such contents correspond to a carbon activity of 0.077 and 0.026, respectively. By contrast, carburization in Applicants' invention is carried out with a carbon activity of at least 0.4. Alonso simply does not disclose each and every element of new Claims 10-15 with sufficient clarity to prove their existence. As such, Alonso does not anticipate new Claims 10-15. Reconsideration is requested.

Rejection Under 35 USC 103

The Office Action rejected Claim 2 under 35 USC 103 over Alonso. The rejection should be withdrawn. It is well settled that to establish a *prima facie* case of obviousness, the USPTO must satisfy all of the following requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references. *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the proposed modification must have had a reasonable expectation of success, as determined from the vantage point of one of ordinary skill in the art at the time the invention was made. *Amgen v. Chugai Pharmaceutical Co.* 18 USPQ 2d 1016, 1023 (Fed Cir, 1991), *cert. denied* 502 U.S. 856 (1991). Third, the prior art reference or combination of references must teach or suggest all of the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496, (CCPA 1970).

The Office Action did not establish a *prima facie* case of obviousness. One of ordinary skill in the art following the teachings of Alonso would not have been motivated to modify Alonso, practice Applicants' invention and expect the results Applicants' have obtained. Alonso teaches gas-phase carburization of tungsten trioxide using CO or a mixture of CO and CO₂ having a very low carbon activity. On page 150, 2nd paragraph, Alonso concludes that the most appropriate conditions for the reduction-carburization of tungsten trioxide include using CO without any CO₂ present (gaseous mixture composition = 100% v/v carbon monoxide). As such, Alonso would have clearly taught away from Applicants' invention, in which carburization is carried out with a mixture containing both CO as well as CO₂ and having a high carbon activity (at least 0.4). Reconsideration is requested.

An object of Applicants' invention is to provide a process for the carburization of tungsten powders or tungsten precursor powders, which allows fast and complete carburization and, on the other hand, ensures that deposition of free carbon on the produced tungsten carbide is avoided (See page 2, lines 21-29). Applicants' process achieves this object by carrying out carburization with a CO₂/CO-mixture and working at a certain temperature and a certain carbon activity. Alonso recommends using solely CO, and thereby encourages the avoidance of mixtures of CO and CO₂.

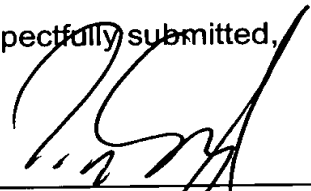
As such, Alonso does not render obvious Applicants' claimed process.
Reconsideration is requested.

One of ordinary skill in the art following Alonso would not have expected benefits Applicants have obtained. Alonso does not teach performing a heat treatment step after carburization. One of ordinary skill in the art would have expected that heat treatment at temperatures higher than the temperature of carburization would result in an increase of particle size of the WC-powder. In case such a powder is used to produce a liquid-phase sintered composite material, e.g. WC-Co, the degree of dispersion of the WC-phase, and hence, the hardness of the composite material would be expected to decrease. Surprisingly, Applicants discovered that that is not the case. By contrast, hardness increase (See Table 2, Example 1 (no heat treatment) vs. Examples 2, 3 and 5 (heat treatment)) is observed. As such, one of ordinary skill in the art following Alonso would not have expected benefits Applicants have discovered. Reconsideration is requested.

In view of the foregoing amendments and remarks, allowance of new Claims 10-15 is earnestly requested.

Respectfully submitted,

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VERSION MARKED TO SHOW CHANGES

As explicitly set forth in 37 C.F.R. Section 1.21(c)(1)(ii), last sentence, a marked up version does not have to be supplied for an added claim or a cancelled claim as it is sufficient to state that a particular claim has been added, or cancelled, and this has been so stated in the Amendment.

In particular, in this case, Claims 1-9 have been cancelled and Claims 10-15 have been newly added.